What is claimed is:

1. A method for depositing a material on a substrate, the method comprising:

placing a substrate in a chamber having a plasma source and on a substrate holder coupled to a RF source; and

depositing a Tunable Etch Rate ARC (TERA) layer on the substrate using PECVD, wherein the amount of RF power provided by the RF source is selected such that the rate of deposition of at least one portion of the TERA layer is greater than when no RF power is applied the substrate holder.

2. The method as claimed in claim 1, wherein the plasma source has an upper electrode and the substrate holder is translatable, the method further comprising:

establishing a gap between an upper electrode surface and a surface of the translatable substrate holder.

3. The method as claimed in claim 2, wherein the gap ranges from approximately 1 mm to approximately 200 mm.

4. The method as claimed in claim 3, wherein the gap ranges from approximately 2 mm to approximately 80 mm.

5. The method as claimed in claim 1, wherein the depositing of the TERA layer comprises:

depositing a bottom layer during a first deposition time, wherein the bottom layer comprises a material having a refractive index (n) ranging from approximately 1.5 to approximately 2.5 when measured at a wavelength of at least one of: 248 nm, 193 nm, and 157 nm and having an extinction coefficient (k) ranging from approximately 0.10 to approximately 0.9 when measured at a wavelength of at least one of: 248 nm, 193 nm, and 157 nm; and

depositing a cap layer during a second deposition time, wherein the cap layer comprises a material having a refractive index (n) ranging from approximately 1.5 to approximately 2.5 when measured at a wavelength of at least one of: 248 nm, 193 nm, and 157 nm and having an extinction coefficient (k) ranging from approximately 0.10 to approximately 0.9 when measured at a wavelength of at least one of: 248 nm, 193 nm, and 157 nm.

6. The method as claimed in claim 5, wherein the bottom layer has a thickness ranging from approximately 30.0 nm to approximately 500.0 nm.

7. The method as claimed in claim 5, wherein the plasma source has an additional RF source and the depositing of the bottom layer further comprises:

operating the additional RF source in a frequency range from approximately 0.1 MHz. to approximately 200 MHz; and

operating the RF source in a frequency range from approximately 0.1 MHz. to approximately 200 MHz.

8. The method as claimed in claim 7, wherein:

the additional RF source is operated in a frequency range from approximately 1 MHz. to approximately 100 MHz; and

the RF source is operated in a frequency range from approximately 0.2 MHz. to approximately 30 MHz.

9. The method as claimed in claim 8, wherein:

the additional RF source is operated in a frequency range from approximately 2 MHz. to approximately 60 MHz; and

the RF source is operated in a frequency range from approximately 0.3 MHz. to approximately 15.0 MHz.

10. The method as claimed in claim 5, wherein the plasma source has an additional RF source and the depositing of the bottom layer further comprises:

operating the additional RF source in a power range from approximately 10 watts to approximately 10000 watts; and

operating the RF source in a power range from approximately 0.1 watts to approximately 1000 watts.

11. The method as claimed in claim 10, wherein:

the additional RF source is operated in a power range from approximately 10 watts to approximately 5000 watts; and

the RF source is operated in a power range from approximately 0.1 watts to approximately 500 watts.

12. The method as claimed in claim 5, wherein the depositing of the bottom layer occurs at a rate from approximately 100 A/min to approximately 10000 A/min.

13. The method as claimed in claim 5, wherein the first deposition time varies from approximately 5 seconds to approximately 180 seconds.

14. The method as claimed in claim 5, wherein the depositing of the bottom layer further comprises:

providing a first process gas, wherein the first process gas comprises at least one of a silicon-containing precursor and a carbon-containing precursor.

15. The method as claimed in claim 14, wherein the providing of the first process gas comprises flowing the silicon-containing precursor and/or the carbon-containing precursor at a first rate ranging from approximately 0.0 sccm to approximately 5000 sccm.

16. The method as claimed in claim 14, wherein the silicon-containing precursor comprises at least one of monosilane (SiH_4), tetraethylorthosilicate (TEOS), monomethylsilane (1MS), dimethylsilane (2MS), trimethylsilane

(3MS), tetramethylsilane (4MS), octamethylcyclotetrasiloxane (OMCTS),and tetramethylcyclotetrasilane (TMCTS).

17. The method as claimed in claim 14, wherein the carbon-containing precursor comprises at least one of CH_4, C_2H_4, C_2H_2, C_6H_6 and C_6H_5OH.

18. The method as claimed in claim 14, wherein the first process gas includes an inert gas comprising at least one of argon, helium, and nitrogen.

19. The method as claimed in claim 5, wherein the depositing of the bottom layer further comprises:

controlling chamber pressure using a pressure control system, wherein the chamber pressure ranges from approximately 0.1 mTorr to approximately 100 Torr.

20. The method as claimed in claim 19, wherein the chamber pressure ranges from approximately 0.1 Torr to approximately 20 Torr.

21. The method as claimed in claim 5, wherein the depositing of the bottom layer further comprises:

providing a DC voltage to an electrostatic chuck (ESC) coupled to the substrate holder to clamp the substrate to the substrate holder, wherein the DC voltage ranges from approximately -2000 V. to approximately +2000 V.

22. The method as claimed in claim 21, wherein the DC voltage ranges from approximately -1000 V. to approximately – +1000 V.

23. The method as claimed in claim 5, wherein the cap layer has a thickness ranging from approximately 5.0 nm to approximately 400 nm.

24. The method as claimed in claim 5, wherein the plasma source includes an additional RF source and the depositing of the cap layer further comprises:

operating the additional RF source in a frequency range from approximately 0.1 MHz. to approximately 200 MHz.

25. The method as claimed in claim 24, wherein the depositing a cap layer further comprises:

operating the RF source in a frequency range from approximately 0.1 MHz. to approximately 200 MHz.

26. The method as claimed in claim 5, wherein the plasma source includes an additional RF source and the depositing of the cap layer further comprises:

operating the additional RF source in a power range from approximately 10 watts to approximately 10000 watts.

27. The method as claimed in claim 26, wherein the depositing of the cap layer further comprises:

operating the RF source in a power range from approximately 0.1 watts to approximately 1000 watts.

28. The method as claimed in claim 5, wherein the depositing of the cap layer occurs at a rate from approximately 50 A/min to approximately 5000 A/min.

29. The method as claimed in claim 5, wherein the second deposition time varies from approximately 5 seconds to approximately 180 seconds.

30. The method as claimed in claim 14, wherein the depositing of the cap layer further comprises:

providing a second process gas, wherein the second process gas comprises at least one of a silicon-containing precursor and a carbon-containing precursor, and an oxygen containing gas.

31. The method as claimed in claim 30, wherein the silicon-containing precursor and/or the carbon-containing precursor are flowed at a first rate ranging from approximately 0.0 sccm to approximately 5000 sccm, and/or the oxygen containing precursor is flowed at a second rate ranging from approximately 0.0 sccm to approximately 10000 sccm.

32. The method as claimed in claim 30, wherein the silicon-containing precursor comprises at least one of monosilane (SiH_4), tetraethylorthosilicate (TEOS), monomethylsilane (1MS), dimethylsilane (2MS), trimethylsilane (3MS), tetramethylsilane (4MS), octamethylcyclotetrasiloxane (OMCTS),and tetramethylcyclotetrasilane (TMCTS).

33. The method as claimed in claim 30, wherein the carbon-containing precursor comprises at least one of CH_4, C_2H_4, C_2H_2, C_6H_6 and C_6H_5OH.

34. The method as claimed in claim 30, wherein the oxygen containing gas comprises at least one of O_2, CO, NO, N_2O, and CO_2.

35. The method as claimed in claim 30, wherein the second process gas includes an inert gas, the inert gas comprising at least one of argon, helium, and nitrogen.

36. The method as claimed in claim 5, further comprising:

turning off a plasma between the deposition of the bottom layer and the cap layer while maintaining the chamber at a pressure between approximately 1mTorr and approximately 20 Torr, with the process gas comprising at least one of a silicon-containing precursor, a carbon-containing precursor, an oxygen containing gas, and an inert gas.

37. The method as claimed in claim 5, wherein the depositing of the bottom layer and the deposition of the cap layer further occur in separate chambers.

38. The method as claimed in claim 5, wherein the depositing of the bottom layer and the deposition of the cap layer occur sequentially in the same chamber while keeping a plasma on throughout the sequential deposition, with the process gas comprising at least one of a silicon-containing precursor and a carbon-containing precursor.

39. The method as claimed in claim 5, wherein a plasma is maintained between the deposition of the bottom layer and the deposition of the cap layer and the reactor ambient between the depositions comprises an inert gas.

40. The method as claimed in claim 5, wherein the depositing of the bottom layer and the deposition of the cap layer occur in one chamber and between depositions, a plasma is turned off and the chamber is subjected to a sequence of evacuations and gas purges.

41. The method as claimed in claim 1, further comprising:

providing a first process gas to a center region of a shower plate assembly coupled to the upper electrode at a first flow rate; and

providing a second process gas to an edge region of the shower plate assembly at a second flow rate.

42. The method as claimed in claim 41, wherein the first process gas comprises at least one of a silicon-containing precursor, and a carbon-containing precursor, and the second process gas comprises at least one of a silicon-containing precursor, and a carbon-containing precursor.

43. The method as claimed in claim 41, wherein the shower plate assembly further comprises a sub region and a third process gas is provided to the sub region.

44. The method as claimed in claim 43, wherein the third process gas comprises at least one of an oxygen containing gas, a carbon containing gas, a nitrogen containing gas, and an inert gas.

45. The method as claimed in claim 1, further comprising:

providing a process gas to a primary region at of a shower plate assembly coupled to the upper electrode a first flow rate; and

providing another process gas to a sub region of the shower plate assembly at a second flow rate.

46. The method as claimed in claim 45, wherein the process gas comprises at least one of a silicon-containing precursor, and a carbon-containing precursor.

47. The method as claimed in claim 45, wherein the other process gas comprises at least one of an oxygen containing gas, a nitrogen containing gas, a carbon-containing gas , and an inert gas.

48. The method as claimed in claim 1, further comprising:

controlling substrate temperature using a temperature control system coupled to the substrate holder.

49. The method as claimed in claim 48, wherein the substrate temperature ranges from approximately 0 C. to approximately 500 C.

50. The method as claimed in claim 48, further comprising:

controlling the temperature of the at least one chamber wall using the temperature control system.

51. The method as claimed in claim 50, wherein the temperature of the at least one chamber wall ranges from approximately 0 C. to approximately 500 C.

52. The method as claimed in claim 48, further comprising:

controlling the temperature of a shower plate assembly using the temperature control system.

53. The method as claimed in claim 52, wherein the temperature of the shower plate assembly ranges from approximately 0 C. to approximately 500 C.

54. The method as claimed in claim 1, further comprising:

purging the chamber;

creating a low pressure in the chamber; and

performing a de-chucking operation.

55. The method as claimed in claim 54, wherein the de-chucking operation comprises

providing a process gas.

56. The method as claimed in claim 55, wherein the process gas comprises at least one of an oxygen containing gas, and a carbon-containing precursor.

57. The method as claimed in claim 1, wherein the deposition of the Tunable Etch Rate ARC (TERA) layer on the substrate includes depositing at least two layers as the TERA layer.

58. The method as claimed in claim 1, wherein the characteristics of the TERA layer are dependent upon the amount of RF power provided by the RF source.

59. The method as claimed in claim 58, wherein the density of the TERA layer is greater than when no RF power is applied the substrate holder.

60. A PECVD system for depositing a Tunable Etch Resistant ARC (TERA) layer on a substrate, the PECVD system comprising:

a chamber having a substrate holder;

a plasma source disposed to create a plasma within the chamber;

a RF source coupled to the substrate holder;

a gas suppy system coupled to the chamber; and

a pressure control system coupled to the chamber, wherein the amount of RF power provided by the RF source is selected such that the rate of deposition of at least one portion of the TERA layer is greater than when no RF power is applied the substrate holder.

61. The PECVD system as claimed in claim 60, further comprising:

a transfer system, coupled to the chamber, for placing a substrate on the substrate holder.

62. The PECVD system as claimed in claim 60, wherein the substrate holder is translatable, the plasma source includes an upper electrode and the translatable substrate holder is configured to establish a gap between an upper electrode surface and a surface of the translatable substrate holder.

63. The PECVD system as claimed in claim 62, wherein the gap ranges from approximately 1 mm to approximately 200 mm.

64. The PECVD system as claimed in claim 62, wherein the gap ranges from approximately 2 mm to approximately 80 mm.

65. The PECVD system as claimed in claim 60, wherein the plasma source includes another RF source and an upper electrode, the another RF source being configured to provide a TRF signal to the upper electrode, wherein the another RF source operates in a frequency range from approximately 0.1 MHz. to approximately 200 MHz.

66. The PECVD system as claimed in claim 65, wherein another first RF source operates in a frequency range from approximately 1 MHz. to approximately 100 MHz.

67. The PECVD system as claimed in claim 66, wherein the another RF source operates in a frequency range from approximately 2 MHz. to approximately 60 MHz.

68. The PECVD system as claimed in claim 65, wherein the another RF source operates in a power range from approximately 10 watts to approximately 10000 watts.

69. The PECVD system as claimed in claim 68, wherein the another RF source operates in a power range from approximately 10 watts to approximately 5000 watts.

70. The PECVD system as claimed in claim 60, wherein the RF source is configured to provide a BRF signal to the translatable substrate holder, wherein the RF source operates in a frequency range from approximately 0.1 MHz. to approximately 200 MHz.

71. The PECVD system as claimed in claim 70, wherein the RF source operates in a frequency range from approximately 0.2 MHz. to approximately 30 MHz.

72. The PECVD system as claimed in claim 71, wherein the RF source operates in a frequency range from approximately 0.3 MHz. to approximately 15 MHz.

73. The PECVD system as claimed in claim 70, wherein the RF source operates in a power range from approximately 0.1 watts to approximately 1000 watts.

74. The PECVD system as claimed in claim 73, wherein the RF source operates in a power range from approximately 0.1 watts to approximately 500 watts.

75. The PECVD system as claimed in claim 60, wherein the gas supply system includes a shower plate assembly and the gas supply assembly supplies a first process gas to a center region of the shower plate assembly and a second process gas to an edge region of the shower plate assembly.

76. The PECVD system as claimed in claim 75, wherein the first process gas comprises at least one of a silicon-containing precursor, and a carbon-containing precursor.

77. The PECVD system as claimed in claim 76, wherein the flow rate for the silicon-containing precursor and/or the carbon-containing precursor range from approximately 0.0 sccm to approximately 5000 sccm.

78. The PECVD system as claimed in claim 76, wherein the silicon-containing precursor comprises at least one of monosilane (SiH_4), tetraethylorthosilicate (TEOS), monomethylsilane (1MS), dimethylsilane (2MS), trimethylsilane (3MS), tetramethylsilane (4MS), octamethylcyclotetrasiloxane (OMCTS),and tetramethylcyclotetrasilane (TMCTS).

79. The PECVD system as claimed in claim 76, wherein the carbon-containing precursor comprises at least one of CH_4, C_2H_4, C_2H_2, C_6H_6 and C_6H_5OH.

80. The PECVD system as claimed in claim 76, wherein the first process gas includes an inert gas, the inert gas comprising at least one of argon, helium, and nitrogen.

81. The PECVD system as claimed in claim 75, wherein the second process gas comprises at least one of a silicon-containing precursor, and a carbon-containing precursor.

82. The PECVD system as claimed in claim 81, wherein the flow rate for the silicon-containing precursor and/or the carbon-containing precursor range from approximately 0.0 sccm to approximately 5000 sccm.

83. The PECVD system as claimed in claim 81, wherein the silicon-containing precursor comprises at least one of monosilane (SiH_4), tetraethylorthosilicate (TEOS), monomethylsilane (1MS), dimethylsilane (2MS), trimethylsilane (3MS), tetramethylsilane (4MS), octamethylcyclotetrasiloxane (OMCTS),and tetramethylcyclotetrasilane (TMCTS).

84. The PECVD system as claimed in claim 81, wherein the carbon-containing precursor comprises at least one of CH_4, C_2H_4, C_2H_2, C_6H_6 and C_6H_5OH.

85. The PECVD system as claimed in claim 81, wherein the second process gas includes an inert gas, the inert gas comprising at least one of argon, helium, and nitrogen.

86. The PECVD system as claimed in claim 75, wherein the shower plate assembly comprises a sub region and the gas supply system is configured to provide a third process gas to the sub region.

87. The PECVD system as claimed in claim 86, wherein the third process gas comprises at least one of an oxygen containing gas, a nitrogen containing gas, and an inert gas.

88. The PECVD system as claimed in claim 86, wherein the flow rate for the third process gas ranges from approximately 0.0 sccm to approximately 10000 sccm.

89. The PECVD system as claimed in claim 87, wherein the oxygen containing gas comprises at least one of O_2, CO, NO, N_2O, and CO_2.

90. The PECVD system as claimed in claim 87, wherein the nitrogen containing gas comprises at least one of N_2, and NF_3.

91. The PECVD system as claimed in claim 87, wherein the inert gas comprises at least one of Ar and He.

92. The PECVD system as claimed in claim 60, wherein the pressure control system comprises at least one dry pump for controlling chamber pressure.

93. The PECVD system as claimed in claim 92, wherein the chamber pressure ranges from approximately 0.1 mTorr to approximately 100 Torr.

94. The PECVD system as claimed in claim 60, further comprising a temperature control system coupled to the substrate holder, the temperature control system being configured to control substrate temperature.

95. The PECVD system as claimed in claim 94, wherein the substrate temperature ranges from approximately 0 C. to approximately 500 C.

96. The PECVD system as claimed in claim 94, wherein the temperature control system is coupled to at least one chamber wall and is further configured to control the temperature of the at least one chamber wall.

97. The PECVD system as claimed in claim 96, wherein the temperature of the at least one chamber wall ranges from approximately 0 C. to approximately 500 C.

98. The PECVD system as claimed in claim 94, wherein the gas supply system includes a shower plate assembly, and the temperature control system is coupled to the shower plate assembly and is further configured to control the temperature of the shower plate assembly.

99. The PECVD system as claimed in claim 98, wherein the temperature of the shower plate assembly ranges from approximately 0 C. to approximately 500 C.

100. The PECVD system as claimed in claim 60, further comprising;

an electrostatic chuck (ESC) coupled to the substrate holder, and

means for providing a DC voltage to the ESC to clamp the substrate to the substrate holder.

101. The PECVD system as claimed in claim 100, wherein the DC voltage ranges from approximately -2000 V. to approximately +2000 V.

102. The PECVD system as claimed in claim 60, wherein the TERA layer comprises a bottom layer deposited during a first deposition time, wherein the bottom layer comprises a material having a refractive index (n) ranging from approximately 1.5 to approximately 2.5 when measured at a wavelength of at least one of: 248 nm, 193 nm, and 157 nm and having an extinction coefficient (k) ranging from approximately 0.10 to approximately 0.9 when measured at a wavelength of at least one of: 248 nm, 193 nm, and 157 nm; and a cap layer deposited during a second deposition time, wherein the cap layer comprises a material having a refractive index (n) ranging from approximately 1.5 to approximately 2.5 when measured at a wavelength of at least one of: 248 nm, 193 nm, and 157 nm and having an extinction

coefficient (k) ranging from approximately 0.10 to approximately 0.9 when measured at a wavelength of at least one of: 248 nm, 193 nm, and 157 nm.